

@database A3000TechnicalNotes

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@author "Calum Tsang"

@master a3000-2.guide

@\$VER: A3000TechnicalNotes Release 2 (07/98)

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Commodore Amiga 3000 Hardware Technical Notes Revision 2
written and compiled by @{"Calum Tsang" link Calum} - July 1998

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@node Introduction "The reasons for this document, and an overview of the Commodore Amiga 3000 system..."

Introduction

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This document was written with the contributions of many UseNet Amiga users who sent in ideas, comments and tips regarding the hardware of the Amiga 3000 computer. If you have any changes or additions, please email them to me @{"here" link Calum}. These technical notes are intended for both desktop and tower models of the A3000, but where no differences are noted, you should assume the same for both setups.

System Overview

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The Amiga 3000 was designed as the third generation high performance Amiga system by Commodore around 1988-89. Unveiled in 1990 with much fanfare, (even a BYTE Magazine cover article) the A3000 incorporates a high performance Motorola 68030 CPU at 16 or 25 MHz, and MC68881/16 or 882/25 floating point coprocessor into a full 32 bit system

architecture with 32 bit memory access. In comparison to Intel systems, the A3000's 68030 is about on par with a 80386.

The A3000 also debuted several new innovations, including the ECS chipset with programmable resolutions, the ECS 8375 Agnus for 2MB of CHIP memory, an integrated SCSI controller, onboard sockets for 16MB of FAST RAM and Zorro III slots. Furthermore, its Display Enhancer, a flicker fixing system which scandoubles and deinterlaces 15 Khz signals allowed for steady output at VGA frequencies. All this was encased in a small, workstation like desktop case.

Later, the A4000 models were produced, but they share a great deal of similarity to the A3000 series-their system architecture is based on the A3000 design.

Five main models of the A3000 were produced:

Amiga 3000/16 - 68030/16 CPU and 68881/16 FPU
Amiga 3000/25 - 68030/25 CPU and 68882/25 FPU
Amiga 3000UX - 68030/25 CPU and 68882/25 FPU
-Amiga 3000/25 with 1.4 Softkick ROM and AMIX,
CBM's SVR UNIX port, sometimes with A3070 tape drive,
and A2410 TMS34010 hires graphics board.

Amiga 3000T - 68030/25 CPU and 68882/25 FPU
-Tower configuration with more slots.

Amiga 3000T40 - 68040/25 CPU and integral FPU
-Tower configuration, but with A3640 CPU board, some
missing 68030 motherboard CPUs.

The Amiga 3000T, a floor standing tower configuration, basically used the same technology as the A3000 desktop. Major differences include vastly improved expansion, such three externally accessible half height 5 inch drive bays, and four PC AT slots. The A3000T40, which interestingly has a different case colouring than the beige of the A3000 line to match the A4000 line, was the first system to use the A3640 040/25 CPU module, which was not shipped in the A3000 desktop because of heat considerations.

@endnode

@node Jumpers "Jumper/NVRAM Reference for the Amiga 3000..."

Jumpers

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The A3000 motherboard has many jumpers which configure the system. Excepted from a UseNet post:

| Jumper | Pins | 313311 | 313311 | 313311 | 313311 | Function                  |
|--------|------|--------|--------|--------|--------|---------------------------|
|        |      | -01    | -02    | -03    | -04    |                           |
| J100   | 4    | 2-3    | 2-3    | 1-2    | 1-2    | Quadrature Clock Phasing  |
| J101   | 3    | 2-3    | 2-3    | 2-3    | 2-3    | FPU Clock Source          |
| J102   | 3    | 2-3    | 2-3    | 2-3    | 2-3    | System Clock Source       |
| J103   | 4    | 3-4    | 3-4    | 3-4    | 3-4    | FPU CS/BERR               |
| J104   | 3    | 1-2    | 1-2    | 1-2    | 1-2    | CPU Clock Source          |
| J151   | 3    | 2-3    | 2-3    | 1-2    | 1-2    | ROM Timing                |
| J180   | 3    | 2-3    | 2-3    | 2-3    | 2-3    | ROM Timing                |
| J181   | 3    | 2-3    | 2-3    | 2-3    | 2-3    | A2000 ROM Comp. Jmpr.     |
| J200   | 3    | 1-2    | 2-3    | 1-2    | 2-3    | A2000 ROM Comp. Jmpr.     |
| J350   | 3    | 1-2    | 1-2    | 1-2    | 1-2    | Tick Clock Source         |
| J351   | 3    | 2-3    | 2-3    | 2-3    | 2-3    | Disable DF1: (1-2 enable) |
| J352   | 3    | 2-3    | 2-3    | 2-3    | 2-3    | Light Pen Source          |

|      |   |     |     |     |     |                               |
|------|---|-----|-----|-----|-----|-------------------------------|
| J481 | 3 | 2-3 | 2-3 | 2-3 | 2-3 | VDE Scan Doubler only jmp.    |
| J482 | 3 | 1-2 | 1-2 | 1-2 | 1-2 | VDE PLL Loop Adjust.          |
| J483 | 3 | -   | -   | -   | -   | VDE Factory test points.      |
| J800 | 3 | 1-2 | 1-2 | 1-2 | 1-2 | WD33C93 Speed                 |
| J851 | 3 | 1-2 | 1-2 | 2-3 | 2-3 | RAM Controller speed jmp.     |
| J852 | 5 | 4-5 | 4-5 | 4-5 | 4-5 | -012A Ramsey only (see notes) |
| J853 | 3 | 2-3 | 2-3 | 2-3 | 2-3 | -012A Ramsey only (see notes) |

**\*Notes:\***

**J150, J151: ROM Timing**

The Rom timing circuit provides four different speed settings to match the output enable and access timing of the system ROMs.

To set the jumpers, determine the output enable time and access times for the ROMs you wish to use. The ROM must have lower value than for the setting you select.

System standard ROMs have T(oe)=110ns, and T(acc)=250ns.

| CLK    | J151 | J150 | T(oe)min | T(acc)min |
|--------|------|------|----------|-----------|
| 16 MHz | 2-3  | 2-3  | 157ns    | 250ns     |
| 16     | 2-3  | 1-2  | 220      | 312       |
| 16     | 1-2  | 2-3  | 282      | 375       |
| 16     | 1-2  | 1-2  | 345      | 437       |
| 25 MHz | 2-3  | 2-3  | 90ns     | 160ns     |
| 25     | 2-3  | 1-2  | 130      | 200       |
| 25     | 1-2  | 2-3  | 170      | 240       |
| 25     | 1-2  | 1-2  | 210      | 280       |

**J180, J181: ROM Compatibility jumpers**

|                 | J180 | J181 |
|-----------------|------|------|
| A2000/A500 ROMs | 1-2  | 1-2  |
| A3000 ROMs      | 2-3  | 2-3  |

**J851-J853 RAM Controller compatibility settings**

|                            | J852 | J853 |
|----------------------------|------|------|
| -012 Ramsey w/256Kx4 RAMs  | 4-5  | 2-3  |
| Later Ramseys w/256Kx4RAMs | 2-3  | 1-2  |
| Later Ramseys w/1Mx4 RAMs  | 1-2  | 1-2  |

See also, @{"ROM Timing Issues" link ROM-TimingIssues}

**NVRAM**

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The A3000 also has a NVRAM configuration which is powered by the same battery which the clock is. It supports the setup of the following:

SCSI Controller ID: This places the onboard SCSI controller at a specific ID location, 7 by default. You can change this to something else, to get a device at 7, but be careful of conflicting the SCSI controller and the device addresses.

Long SCSI Timeout: This slows the boot process for SCSI drives, for those units which take longer to spin up and be ready.

Synchronous SCSI: This enables Synchronous SCSI mode, which can speed access on some drives.

This is fully operational on Kickstart 3.1.

Multiple LUNs Mode: This enables multiple LUN's, which allows for multiple drives at each address.

These options can be toggled using various freeware programs available on the Aminet file archive on the Internet. SCSIIPrefs (Aminet:hard/drivr/SCSIIPrefs.lha) is one of them, but there are many others. Some things to note: It's a better idea to get a Prefs program that is simple, basic and doesn't use any OS extensions like MUI, as if you accidentally set something wrong and your system doesn't boot, it'll be easier to load your basic Prefs program than something which requires all of MUI. Why do I write this? A friend did this and had to install a base MUI setup, taking many extra hours.

@endnode

@node Memory "Memory Expansion for the Amiga 3000..."

Memory

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There are three main types of memory for the A3000, CHIP, FAST and FAST external memory. Of them, the A3000 supports 2MB of CHIP and up to 16 MB of FAST on the motherboard. External FAST memory usually resides on a Zorro expansion card or a FAST slot accelerator.

For CHIP RAM, every A3000 desktop ships with 1MB soldered on the motherboard. There are 8 sockets for another 1MB. Many A3000 configurations shipped with 1MB of FAST memory installed, which were intended to be moved to these CHIP sockets later on.

Fast RAM on the A3000 desktop is added via 32 sockets for ZIP package DRAM. These chips are pretty hard to find, and most of the time, other A3000 owners sell them into the used market. One suggested source was from companies that sell ZIP RAM for Sinclair QL accelerators (A British PC), such as from Qbranch: PO Box 7, Portslade East Sussex, BN41 2ND, England (qbranch@qbranch.demon.co.uk). This was suggested by Simon Goodwin, who lives in the UK. Other sources of ZIP RAM include desoldering them from old A2620/30 accelerators and the Commodore CDTV, both of which use the lower density 256Kx4 chips. Of course, you'd have to scavenge four CDTV's to get a usable bank of 4MB, assuming you didn't burn out any chips from the desoldering process. Two variations of these ZIPs exist: Page Mode and Static Column. SC ZIPs have the advantage of being 10% faster, but Page Mode ZIPs are more compatible with the A3640 040 CPU board with 2.04 ROMs (as opposed to 3.1 ROMs which use SC fine), and also fit into the A2386 Bridgeboard and run faster in that. Page Modes are also slightly cheaper.

In general, you must fill out the entire bank with chips, and the lower the speed the better. The given speeds are minimum guidelines specified by Commodore. Anything past 70 ns is needlessly fast though.

Chip RAM for Amiga 3000 Desktop

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Via the U267-U274 DIP package sockets...

Density	Name	Package	Speed	Pcs/Bnk	Banks/Total
256Kbit x 4	44256	20 pin DIP	120ns	8	1/1MByte

These can be either Static Column or Page Mode access type DRAMs. It does not matter which type, there is no speed degradation. These are very common chips, and you can find them on older VGA boards for PCs. They're also the same kind used on the A2091 RAM and SCSI board. Chip RAM autoconfigures without jumpers.

Fast RAM for Amiga 3000

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Via the U850D-U857D DIP package Bank 0 Sockets...

|             |            |      |   |           |
|-------------|------------|------|---|-----------|
| 256Kbit x 4 | 20 pin DIP | 80ns | 8 | 1/1MByte  |
| 1Mbit x 4   | 20 pin DIP | 80ns | 8 | 1/4MBytes |

Via the U850-U881 ZIP package Bank 0-3 Sockets...

|             |            |      |   |            |
|-------------|------------|------|---|------------|
| 256Kbit x 4 | 20 pin ZIP | 80ns | 8 | 4/4MBytes  |
| 1Mbit x 4   | 20 pin ZIP | 80ns | 8 | 4/16MBytes |

These should all either be Static Column or Page Mode.

As noted above, some A3000's shipped with 1MByte of FAST memory in DIP package, waiting to be transplanted into the sockets for CHIP RAM, once more FAST RAM was installed. Those FAST memory sockets are the U850D-U857D 20 pin DIP places, Bank 0. This bank is electrically mapped to Bank 0 U850-U857, 20 pin ZIP sockets. As a result, one can make a three megabyte A3000 configuration by putting 256Kbit x 4 chips into the FAST RAM DIP sockets without buying ZIPs. Or a six meg setup, using 1Mbit x 4 chips. The DIP FAST sockets cannot be used with the ZIP sockets all together, as the two Bank 0 areas are basically pinned to each other (as noted by the same component numbers, one set with a D for DIP). One could have 4MBytes of DIPs for FAST, then another 12MBytes of FAST in ZIPs placed into Banks 1-3, but not 4MBytes in the DIP area and 16MBytes in all four ZIP banks.

256Kbit and 1Mbit banks cannot be mixed. One cannot have 4MBytes of 1Mbit chips, and then 1MByte via another bank of 256Kbit chips. Of course, one can't mix individual chips either! All four banks are either low or high density banks.

Jumper J852 selects the size of the RAM, and 1-2 designates 1Mbit sizing. 2-3, further from the arrowhead, denotes 256Kbit.

#### Tower A3000

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For the A3000T, CHIP RAM is in ZIP package, but they're 256Kbit x 4. The FAST RAM is in similar configuration at the same locations.

SIMM Adapters

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A number of sources for ZIP to SIMM converter boards have popped up and are often discussed on Usenet and elsewhere, on web pages. These little boards have machine legs which fit into the ZIP sockets and give 72 pin SIMM sockets for adding memory. Be aware that most, if not all, SIMM RAM is Page Mode.

#### FAST External Memory

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As mentioned above, FAST External Memory resides on Zorro expansion cards, or FAST slot expansion cards. 16 bit RAM boards made for the A2000 in general will work fine in an Amiga 3000 system, but as the main

68030 CPU is 32 bit, anything stored in this 16 bit segment will be slowly accessed, compared to the 32bit motherboard memory.

32 bit RAM boards will most likely utilize the Zorro III bus. An example would be the DKB3128, which has four SIMM sockets, and also the PP&S ProRAM 3000, which is no longer made.

@endnode

@node Boards "Expansion Boards and Devices Experiences..."

Introduction

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The Amiga 3000 desktop can hold a total of four Zorro II or III 100 pin expansion cards. Two are inline with PC AT type slots, for use with a Bridgecard, and another is inline with a video slot, similar to the A2000's video slot. The Zorro slots are similar to the Amiga 2000's, but with the Zorro III mode, which certain boards can automatically detect and utilize. The PC AT slots are powered, for use with nonintelligent cards like fan cards and TBC cards for video work, but cannot be accessed electronically from the Amiga without the use of a Bridgecard or similar device. Having the slots overlap is troublesome, as you have to juggle boards and carefully select boards for your machine. Heat and ventilation concerns should also be considered, as the cards go in sideways onto a daughterboard which then fits in vertically onto the A3000 motherboard.

In general, any board that you can use with the A2000, should work fine with the A3000. Obviously, certain attributes of the A3000 will affect the board's performance. For instance, the physical mounting of the cards in the case may be troublesome for hard cards which usually mount vertically. Or the video slot, which has a slightly different bracket. As a result of this, the VideoToaster 2000 board does not fit without sawing the frame for Input 1. Heat will be a big concern.

Other problems arise with the 32 bit nature of the A3000, with all of it's onboard devices. The A2091 A2000 SCSI controller is a good example: In an A2000, it is accessed by the name "scsi.device". This is also the device name used by the A3000's onboard WD33C93 SCSI controller. When you slot a A2091 into a A3000, the device name magically turns into "2nd\_scsi.device". RAM boards, the 16 bit kind for the A2000, are put into the memory pool of the A3000, but will run a lot slower compared to the system's normal 32 bit FAST RAM. There are a few boards that absolutely will not work in an A3000.

There are a few technical differences which may cause incompatibilities between A2000 and A3000, but they shouldn't pose too many problems. They are noted in the Third Edition of the Amiga Hardware Reference Manual.

There is one more slot on the Amiga 3000, and that is the FAST slot, or CPU Direct slot. This allows for high performance expansion for a new CPU, such as an accelerator board. This is similar to the Amiga 4000's FAST slot.

This is listing of expansion boards and other devices which can fit in an Amiga 3000. Also included are the compatibilities of each product, and possible fixes, from Usenet posters. We (myself and the posters) cannot be held responsible for inaccurate information here.

Product Name:       A2058 / 16 bit 8MByte Memory Card  
Manufacturer:       Commodore  
Mode:                Zorro II

Comments: Runs fine, 16 bit access is obviously slower.  
User: Calum Tsang

Product: A2060, Arcnet board  
Manufacturer: CBM  
Mode: Zorro II  
Comments: needs fixed a2060.device, available from Aminet.  
User: Ralf R. Radermacher (r.radermacher@rrader.dinoco.de)

Product Name: A2065 / Ethernet Board  
Manufacturer: Commodore  
Mode: Zorro II  
Comments: Works.  
User: Mike Cheng (memfc@alinga.newcastle.edu.au)

Product Name: A2088 / XT Hardware Emulator  
Manufacturer: Commodore  
Mode: Zorro II  
Comments: Works. Turn 030 caching off.  
User: Calum Tsang

Product: A2232 / 7 Port Multi Serial Board  
Manufacturer: CBM  
Mode: Zorro II  
Comments: No probs here.  
User: Ralf R. Radermacher (r.radermacher@rrader.dinoco.de)

Product Name: A2286 / AT Hardware Emulator  
Manufacturer: Commodore  
Mode: Zorro II  
Comments: Works. Turn 030 caching off. Has a sandwich board  
that fits on the main card, taking up a slot.  
User: Calum Tsang

Product Name: A2300 / Internal NTSC Genlock  
Manufacturer: Commodore  
Mode: Video Slot  
Comments: Works, except deinterlacer output has glitches from NTSC sync.  
You may need a steady sync source for powering up.  
User: Calum Tsang

Product Name: A2410 / Hires Graphics Board TMS34010 TIGA  
Manufacturer: Commodore  
Mode: Zorro II  
Comments: Works fine, slow in moving data to board. Use EGSA2410.  
User: Calum Tsang  
Comments: Registered CyberGraphX contains an A2410 driver, which is  
faster than EGS, but still slow.  
User: Jvrg Raftopoulos (raftopou@stud.uni-frankfurt.de)

Product Name: A3640 / 68040 Processor Card  
Manufacturer: Commodore  
Mode: FAST Slot  
Comments: Runs hot, has many chip revision problems.  
User: Calum Tsang

Product Name: A4091 / SCSI2 Controller  
Manufacturer: Commodore / DKB  
Mode: Zorro III  
Comments: Works with Buster11, but not with a 3640.  
User: Simon N Goodwin (simon@silicon.studio.co.uk)

Product Name: AmigaNet 1.1 / 10Base2 and AUI Ethernet Board  
Manufacturer: Hydra Systems  
Mode: Zorro II  
Comments: Works fine, no problems.  
User: Calum Tsang

Product Name: Ariadne / Ethernet Board  
Manufacturer: MacroSystems  
Mode: Zorro II  
Comments: Working fine in A3000T  
User: Daniel Tartavel (dtartavel@centaury.gatelink.fr.net)  
Comments: Working fine in A3000/25 desktop, with Rev 6, 7, 11 Buster.  
User: Jvrg Raftopoulos (raftopou@stud.uni-frankfurt.de)

Product Name: Cybervision 64/3D / RTG Graphics Board  
Manufacturer: Phase 5 Digital Products  
Mode: Zorro II/III  
Comments: If original 68030 is used, Cybergraphics Driver works only in Zorro II mode; with a rework on the daughterboard and the tool "Enforcer" installed. Picasso96 driver works in both (Zorro II/III) fine!  
User: Mario Brammen (mbrammen@cwv.de)

Product: Cyberstorm 040/060 Mk I / 040/060 Accelerator Board  
Manufacturer: Phase 5 Digital Products  
Mode: FAST Slot  
Comments: Too tall to fit in A3000 desktop FAST slot.  
User: Simon Goodwin (simon@studio.woden.com)

Product: Cyberstorm 060/50 Mk II / 060 50 MHz Accelerator Board  
Manufacturer: Phase 5 Digital Products  
Mode: FAST Slot  
Comments: No probs, optional SCSI plug-in module (CyberSCSI) needs wire bridge from U301 to pin 87 (?) of FAST slot. CyberSCSI is a bad mechanical fit in 3000T and won't fit at all in an A3000 desktop  
User: Ralf R. Radermacher (r.radermacher@rrader.dinoco.de)  
User: Simon Goodwin (simon@studio.woden.com)  
User: Tristan Fletcher (tristan.fletcher@severed.overflow.com)

Product Name: Delfina Classic / DSP 16 bit Audio Card  
Manufacturer: Petsoff Limited Partnership  
Mode: Zorro II  
Comments: Works fine, except required adjustment of slot, and adjustments to card from manufacturer. Board believes it has crashed occasionally.  
User: Johnny C. Kitchens (kitchens@letter.com)

Product Name: Emplant Deluxe / Emulation Board  
Manufacturer: Utilities Unlimited  
Mode: Zorro II  
Comments: Works fine, with e586 Module as well.  
User: Greg Brown (gbrown@termv.jammys.net)

Product Name: FastLane Z3 / SCSI2 Controller and RAM board  
Manufacturer: Phase 5 Digital Products  
Mode: Zorro III  
Comments: requires rev 11 buster which doesn't work in A3000/16, 9.03  
User: Johnny C. Kitchen (kitchens@letter.com)



Product Name: GoldenGate 2+ / PC Expansion Adapter  
Manufacturer: Software Results  
Mode: Zorro II / PC AT  
Comments: Running fine with PC serial UART and modem cards  
<http://www.infinet.com/~erd/GG2/>  
User: Robert Davis (bobdavis@cadvantage.com)

Product Name: GVP G-Force 040/40  
Manufacturer: GVP  
Mode: FAST Slot  
Comments: No problems in 3000T  
User: Tristan Fletcher (tristan.fletcher@severed.overflow.com)

Product Name: ioExtender / Dual Serial and Parallel Port Board  
Manufacturer: GVP  
Mode: Zorro II  
Comments: Works fine, no problems. (non ROM version)  
User: Calum Tsang

Product Name: AmigaNet 1.1 / 10Base2 and AUI Ethernet Board  
ISDN-Master II / internal passive ISDN TA and Telephone  
Manufacturer: BSC  
Mode: Zorro II  
Comments: Working fine in A3000/25 Desktop with Rev 6,7,11 Busters.  
User: Jvrg Raftopoulos (raftopou@stud.uni-frankfurt.de)

Product Name: Live 2000! / Framegrabber/Video Digitizer  
Manufacturer: ASquared Development  
Mode: Zorro II  
Comments: Requires PAL upgrade for Zorro III timing, and Kick 1.3.  
I could not get the old revision PALs on a Live running.  
A3000 revision PALs have "A3000" silkscreened on them.  
User: Calum Tsang

Product: Maestro (non-Pro version) / Sound Card  
Manufacturer: MacroSystem Germany  
Mode: Zorro II  
Comments: Input-only version of the later Maestro Pro.  
User: Ralf R. Radermacher (r.radermacher@rrader.dinoco.de)

Product: Mandala/Interactor / Virtual World Performance System  
Manufacturer: Vivid Group / Very Vivid  
Mode: Zorro II  
Comments: Mandala uses a set of boards, including the Live! 2000  
A2232 or ASDG DualSerial, as well as external devices.  
The only one that poses a real problem is the Live!  
which requires correct PAL revisions.  
User: Calum Tsang

Product: Merlin II / RTG Graphics Board  
Manufacturer: XPert (defunct), ongoing S/W support by ProDev (Germany)  
Mode: Zorro III  
Comments: No probs but runs extremely hot, slightly oversized  
and shouldn't be mounted in the bottom slot  
of a 3000 desktop (risk of short-circuit from  
solder side to chassis)  
User: Ralf R. Radermacher (r.radermacher@rrader.dinoco.de)

Product Name: MultifaceCard 3  
Manufacturer: BSC  
Mode: Zorro II

Comments: Works up to 115,200 baud but not MIDI 31,250.  
GVP IO can go faster and has less interrupt  
overhead, but MFC3 has far more supporting  
software for the parallel port.  
User: Simon N Goodwin (simon@silicon.studio.co.uk)

Product: Oktagon 2008, SCSI controller  
Manufacturer: BSC  
Mode: Zorro II  
Comments: No probs.  
User: Ralf R. Radermacher (r.radermacher@rrader.dinoco.de)

Product Name: Personal TBC / Time Base Corrector  
Manufacturer: Digital Processing Systems  
Mode: XT  
Comments: Works, but if you are overloading your bus, the TBC  
may not work properly. Try removing cards to test for  
too much draw on the power supply.  
User: Calum Tsang

Product: Piccolo / RTG EGS Graphics Board  
Manufacturer: Ingenieurbuero Helfrich (defunct)  
Mode: Zorro III  
Comments: No probs.  
User: Ralf R. Radermacher (r.radermacher@rrader.dinoco.de)

Product Name: Picasso II / RTG Graphics Board  
Manufacturer: VillageTronic  
Mode: Zorro II  
Comments: Works fine.  
User: Greg Brown (gbrown@termv.jammys.net)

Product Name: ProRam 3000  
Manufacturer: Progressive Peripherals & Software  
Mode: Zorro III  
Comments: Works fine with Buster 7, but not with Buster 11.  
User: Ezequiel Partida (epartida@mail.tij.cetys.mx)

Product Name: Retina Z2 / RTG Graphics Board  
Manufacturer: MacroSystem Germany  
Mode: Zorro II  
Comments: Works fine, but very slow. No CGX support.  
User: Mario Brammen (mbrammen@cwv.de)

Product Name: Retina Z3 / RTG Graphics Board  
Manufacturer: MacroSystem Germany  
Mode: Zorro III  
Comments: Works fine, in 3000T.  
User: Brian King (Brian\_king@software.mitel.com)  
Comments: Works fine in A3000/25 desktop, with Rev 6, 7, 11 busters.  
User: Jvrg Raftopoulos (raftopou@stud.uni-frankfurt.de)

Product Name: Spectrum Z3 / RTG Graphics Board  
Manufacturer: GVP  
Mode: Zorro II/III  
Comments: No problems with older buster.  
User: Mike Cheng (memfc@alinga.newcastle.edu.au)

Product Name: SupraRAM 2000 / 16 bit 8MB Memory Expansion Board  
Manufacturer: Supra Corporation

Mode: Zorro II  
Comments: Works fine, access to 16 bit RAM is obviously slower.  
User: Calum Tsang

Product Name: SupraSCSI-WordSync / Zorro II SCSI Adapter  
Manufacturer: Supra Corporation  
Mode: Zorro II  
Comments: Works slow, but works with Mustek scanner.  
User: Mario Brammen (mbrammen@cwv.de)

Product Name: Toccatal6 / 48 KHz 16 bit Audio Card  
Manufacturer: MacroSystem Germany  
Mode: Zorro II  
Comments: Runs fine.  
User: Calum Tsang

Product Name: VideoToaster 2000 / Switcher/SEG/CG/Paintbox  
Manufacturer: NewTek Incorporated  
Mode: Video Slot  
Comments: Requires cutting of chassis to fit, v1.0 software does not work with SuperDenise chip. v2.0 fixes this.  
User: Calum Tsang

Product Name: VideoToaster 4000 / Switcher/SEG/CG/Paintbox  
Manufacturer: NewTek Incorporated  
Mode: Video Slot  
Comments: Has flippable connector bracket for easy installation. Also works in A2000/4000. NewTek recommends case to be on.  
User: Calum Tsang

Product: VLAB / Framegrab video digitizer  
Manufacturer: MacroSystem Germany  
Mode: Zorro II  
Comments: No probs.  
User: Ralf R. Radermacher (r.radermacher@rrader.dinoco.de)

Product Name: VLAB Motion / Motion JPEG Nonlinear Editing Card  
Manufacturer: MacroSystem Germany  
Mode: Zorro II  
Comments: Runs hot, 1.3 version board has least troubles.  
User: Calum Tsang

Product Name: Warp Engine 3028 / 040 28 Mhz Accelerator  
Manufacturer: MacroSystem Development US  
Mode: FAST Slot  
Comments: Works fine. Physically mount carefully.  
User: Calum Tsang

Product Name: Warp Engine 3040 / 040 40 Mhz Accelerator  
Manufacturer: MacroSystem Development US  
Mode: FAST Slot  
Comments: Works fine in A3000/16.  
User: Johnny C. Kitchen (kitchens@letter.com)

Mail more working board experiences to me!

Product Name:  
Manufacturer:  
Mode:  
Comments:  
User:

@endnode

@node Floppy "Floppy Drives..."

Floppies

~~~~~

The A3000 has two mounting locations for internal floppy drives. These are custom designed for the Chinon FB354 and FB/FZ357A, which the front panel LED and eject button are specific. The slimline models of the high density drives may require some tinkering to fit properly. Factory configured, the first internal drive is the one to the left. Of course, this can vary. An unused bay, or one occupied by an hard disk, should be covered with the custom moulded textured front cover part.

See also, @{"Case-Eject Buttons and Cover Panels" link "Floppies-ButtonsPanels"}

The two models from Commodore are the A3010, the Chinon FB354, 880KByte double density, and the A3015, the Chinon FB/FZ357A, 1.76MByte high density. Note this is not the FZ357, without the A designation. The FZ357A was designed specifically for Commodore and is out of production, the FZ357 is actually still in active production and is found in many PC clones. It is not compatible with the slow spin rate required by the Amiga custom chipset.

There has been much talk about modifying PC high density industry standard drives to work by dividing the motor control output with a flip flop or something similar. No definitive plans have showed up. The easiest way is to acquire a third party model or a used A2015/3015/4015.

All drives should be jumpered as DS0, Drive 0. This is contrary to PC convention, where all drives are DS1. DF0:, the first Amiga floppy, is set as DS0, on a connector without the flip in the cable. The second floppy, DF1: should be on the connector with a flip in the cable, but still set as DS0. Power is supplied from the mini 4 pin floppy power connector, and the drive is secured to the drive tray with a set of screws.

To set the machine for two internal drives, remember to jumper the motherboard accordingly:

See also, @{"Jumpers" link "Jumpers"}

@endnode

@node SCSI "Small Computer Systems Interface..."

SCSI Interface

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The A3000 benefits from a DMA SCSI adapter, based around the Western Digital WDC33C93 Narrow SCSI1 chip. It can accomodate a variety of peripherals and storage, including SCSI flatbed scanners, CDRoms, and hard disks. An A3000's hard disk is usually interfaced through the SCSI port. While there are two physical ports, a 50 pin header connector internally, and a DB25 Macintosh Plus style port externally, it is the same bus electrically.

The A3000 should be interfaced in the following manner:

----- | -----  
T--|extdev|--...+-| SCSI |-...--|intdev|---T

----- | -----

Devices are placed in daisychain fashion, with cables going both externally and internally. However somewhere on this chain, the SCSI adapter is present.

See also, Warren Block's SCSI Examples guide available around the Internet and often posted to Usenet newsgroups. One place to get it is:

<http://www.nationalamiga.com/t-SCSIExamples.html>

#### ID Numbers

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It is generally recommended to put removable drives like CDROM and Syquests with a higher ID number. The adapter itself is Unit 7. This is adjustable using various NVRAM settings.

See also, @{"Jumpers" link "Jumpers"} for how to set NVRAM options.

Cabling

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Cabling should follow SCSI specifications. In general, most cables, as long as the drive follows the right specification, should work. For external devices, you'll want to get a DB25 male connector on the Amiga system end, for internal, 50 pin header.

#### Termination

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As with any SCSI bus, both ends of the chain must be terminated. Depending on the configuration, and owner, the A3000 motherboard may or may not be terminated. If it is, and you want external devices, you should remove motherboard termination. If not, leave it on. The end of the internal drive chain should be terminated. The internal terminators are at RP802, RP803, and RP804.

If you have removed motherboard termination, make sure the last external device is terminated. This could be inside your drive enclosure, or on the end of a passthrough connector. Usually the Amiga supplies power for termination. Remember to check your documentation for determining which device needs to supply termpower.

See also, @{"SCSI-Termination Power" link "SCSI-TermPower"}

Some users suggest using active termination both internally and externally. Many SCSI issues are fixed with the Rev -08 SCSI chip, as well as the AMD compatible replacements. These can be sourced in the UK from Tim Corringham, RamJam, UK phone 0118 946 5940, at £26.50. Depending on your system and your devices, replacement of the 33C93 can solve or create problems. It really depends on your specific configuration.

Types of SCSI

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Differential SCSI - Will not work with A3000. Requires Narrow to Differential adapter. May as well buy new drive. Often used in Sun and IBM RS/6000 workstations.

Wide SCSI - Will work with A3000, but requires adapter plug that is relatively pricey and hard to find.

SCSI2        - Will work with A3000. SCSI2 is a superset of  
              commands of SCSI1.

Fast SCSI2    - Will work, but not at full speed.

SCSI3        - Should work with A3000.

UltraSCSI    - Brand name for SCSI3, should work.

FireWire DV1394    - Will not work. Completely different standard,  
                      it's not SCSI at all. Apple Macintosh users  
                      often confuse FireWire with SCSI3. Used  
                      in the Sony DCR-VX1000 6mm Digital cameras  
                      for transfer of motion video and sound.

USB          - Will not work. Another different standard,  
              not SCSI at all. Often confused with 1394,  
              which is confused with SCSI. Universal  
              Serial Bus, new Intel/Windows hardware spec.

@endnode

@node Credits "Here's the people who've contributed to the A3000 Technical Notes  
Package..."

Credits

~~~~~

The following people sent in all kinds of information, ideas, and
comments for this package of technical notes. Thanks to everyone for
contributing! If you have some more experiences and information to add,
please email me.

Calum Tsang	(tsangc@ecf.utoronto.ca)
Warren Block	(wblock@rapidnet.com)
Mario Brammen	(mbrammen@cwv.de)
Greg Brown	(gbrown@termv.jammys.net)
Mike Cheng	(memfc@alinga.newcastle.edu.au)
Robert Davis	(bobdavis@cadvantage.com)
Robert Dick	(dickrp@wckn.dorm.clarkson.edu)
Simon N Goodwin	(simon@silicon.studio.co.uk)
Brian King	(Brian_king@software.mitel.com)
Johnny C. Kitchen	(kitchens@letter.com)
Ezequiel Partida	(epartida@mail.tij.cetys.mx)
Ralf R. Radermacher	(r.radermacher@rrader.dinoco.de)
Jvrg Raftopoulos	(raftopou@stud.uni-frankfurt.de)
Daniel Tartavel	(dtartavel@centaury.gatelink.fr.net)

@endnode

@node Neat "Interesting trivia about the Amiga 3000..."

Did You Know

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...early A3000's shipped with a 1.4 ROM? It's the ROM that loads up  
the Kickstart image from devs:kickstart and reboots into that  
image. If you startup into the ROM selection menu, and click  
on the top left corner (like a close button) you'll be booted  
into a 1.4 Startup-Sequence! Check out the version numbers

and the odd gadgets.

...the A3000T was originally called the A3500? These were 3000T prototypes in CBM PC60III Tower cases. They have green power buttons, and two hard disk LEDs. I actually saw one at Commodore Canada, and there's another in the Dave Haynie video "Deathbed Vigil" in the walkthrough of CBM Engineering. Many have sent in other reports from the Benelux countries to out in Germany. There are a few of these.

...there was a system called the A3000 Plus? This prototype had the AGA chipset, with a provision for a DSP onboard. Unfortunately, the project was killed by CBM management. A few were liquidated a few years ago, but it is unknown how well they worked.

...Sun Microsystems originally considered the A3000UX as a low end UNIX box to sell with their high end SPARCstations? The deal fell through with Commodore management.

...the Amber chip in the deinterlacer circuitry is named after the designer's daughter?

@endnode

@node Deinterlacer "Information about the Amber Deinterlacer..."

Deinterlacer

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See also, @{"Deinterlacer-Tuning" link "Deinterlacer-Tuning"}

The Amiga traditionally operates in a native NTSC or PAL mode video system. All of its normal output runs at 15 KHz, 50 or 60 Hz refresh. In high resolution modes such as NTSC:HiresInterlaced, the output is interlaced, which means more information is presented by quickly swapping "fields" of video data on the monitor. This generates a horrible flicker, which some Amiga users have grown accustomed to, but others find disturbing.

While many solutions were presented by the early Amiga community, such as wearing sunglasses and putting dark glare shields on their monitors, Commodore came up with an ingenious device, named the Display Enhancer, or FlickerFixer. (Actually, another company, MicroWay, made a similar product, trademarked FlickerFixer, but....) This is implemented into every Amiga 3000 system, and can be also purchased separately for A2000/4000 systems in the A2320 board.

The Display Enhancer is a scandoubler / deinterlacer system. It takes the 15 KHz output, and converts it into 31 KHz signals suitable for flicker free video. If it's noninterlaced, it doubles the signal, removing visible scanlines. If it's interlaced, it deinterlaces it, removing flicker. If it's not 15 KHz, it just passes the signal through. The entire system can be defeated by a toggle switch on the back.

While the system works remarkably well, there are a few problems. For one, it will only affect NTSC: (or PAL:) signals. And some video modes like NTSC:SuperHiresInterlaced don't quite work properly due to hardware constraints. But all in all, it means A3000 owners can get VGA quality displays without running their systems in odd screen modes.

Technical Information

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As far as I know, the Amber deinterlacer circuitry samples in the 15KHz signal from the motherboard, and converts it to 31 KHz. There is a fast dual port video memory segment in the system that accomplishes the simultaneous sampling and output.

@endnode

@node Monitors "What monitors and other output devices you can use with the Amiga 3000..."

### Monitors

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The A3000 series can output a variety of video signals. Like every other Amiga, it has a 15 Khz RGB Analog port, suitable for attaching an RGB monitor like the Commodore 1084 series. This port can also be used for a video encoder like the Commodore A520 modulator for composite and RF signals, and for genlocks, like the SuperGen. It's also usable for video system hacks like the DCTV paintbox. 15 Khz monitors, while cheap, are really a pain because of the interlace flicker. One port the A3000 doesn't have, is the mono composite out found on the A500/2000, or the colour composite jack on the A600/1200.

The A3000 also has a special Amber deinterlacer circuit, which can output clean 31.5 Khz RGB Analog video too. This is similar to VGA, and you can attach a PC VGA monitor to this port with no trouble. This port scandoubles or deinterlaces the 15 khz signal in hardware, unlike the AGA DoubleNTSC mode. This means no speed degradation, and no extra DMA bandwidth. It also has no effect on NTSC: applications, such as the VideoToaster, but means you can run the Switcher or CG flickerfree.

VGA type devices can also be added to the A3000 deinterlacer output, including VGA/Composite adapters and LCD projection panels.

Most A3000 owners should pick up a multiscanning PC SVGA monitor. You'll want it to be compatible with 50 Hz refresh (VGA level is 60 Hz) for PAL compatibility, and also higher resolutions, if you purchase a graphics card in the future. Some will suggest a full 15 Khz multiscan monitor like the Commodore 1950 and 1960, but the added expense and trouble (both are known to have reliability problems) aren't worth the benefit of having a 15 Khz fallback. The deinterlacer already upscans any NTSC signal anyways.

Finally, the A3000, with its ECS chipset, can generate VGA level signals in a method similar to the AGA systems. Modes such as Productivity: raise the Amiga sync rates, while using up DMA bandwidth and slowing the machine down. It's probably not a good idea to use these modes, but they can be generated. The signal will come out of the 31 Khz deinterlacer port, but the deinterlacer will just pass it through untouched. The signal also comes out the DB23 video port simultaneously.

@endnode

@node SCSI-TermPower "Issues with termination power on some A3000 units..."

Termination Power

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Some A3000's were shipped from Commodore with the termination power diode soldered on backwards. To complicate the matter, the diode silkscreen may also be done incorrectly. As a result, you may experience troubles with terminating the bus properly.



One way to check for termination power is to use a voltmeter or DMM to read the voltage off of pin 25 on the external SCSI port using the shield for ground. There should be 5V there.

@endnode

@node Overclock "Overclocking the A3000...a procedure not recommended..."

Overclocking the Amiga 3000

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Many Amiga users, in the continuing urge to accelerate their systems have tried increasing the CPU clock frequency, known as overclocking, to increase the processing power of the machine.

Most of the schemes involve soldering new oscillators or using alternate clock sources on the motherboard to retime the CPU at a new speed. While any overclocking hack is dangerous and prone to failure, prematurely burning out the chip, modifying an A3000 is particularly bad: the 030 is surface mounted. Unless you work at some electrical engineering firm, and can replace such a part, your machine is toast if you burn out your processor.

All A3000 owners are recommend to save up their pennies and buy a proper accelerator that fits onto the 200 pin FAST slot.

@endnode

@node ToasterIncompatibilities "Some common problems with the VideoToaster in the A3000"

Problems with the VideoToaster in the A3000

~~~~~

There are a few little snags with using NewTek's popular VideoToaster boards in the A3000's. NewTek doesn't really recommend the Toaster 2000 board for desktop A3000's.

Putting a Toaster in an A3000 can alter the colours of the display, and NewTek has a patch for this to correct the problem. Screens often turn purplish as a result.

Toaster 2000

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@{"Video Slot-Physical Fit" link "Videoslot-Fit"}

Including the fit of Input 1 BNC on this card, users should be aware that Toaster 1.0 software didn't work with the SuperDenise ECS chip. Version 2.0 corrects this problem.

Toaster 4000

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The Toaster 4000 card is configurable to both ECS (A2000/3000) and AGA (A4000). This involves switching numerous jumpers, documented in the manual. The fit problem of the connector block is solved with a flip around board.

Toaster Flyer

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The Flyer should be used with an external drive enclosure. NewTek sells an Octopus cable that routes all the cabling externally for this

purpose.

Both boards are a tight fit, and one should be concerned with heat, insulation, and power. Third party adapters exist for moving the boards out with an extension cable into a second case.

Another idea might be to move cards like TBC's and extra hard disks into an inexpensive PC clone case with a used 286 motherboard powering them, allowing for greater airflow and less heat generation in the desktop A3000 case.

VideoToaster 2000 users may consider upgrading to the Toaster 4000 card, which adapts to the A3000/4000 case with an ingenious flip around connector

block. While the expense is great, it also allows for the Toaster Flyer nonlinear editing option, and it is recommended by NewTek for the A3000.

@endnode

@node Videoslot-Fit "Physical mounting in the Advanced Video Slot..."

Mounting Boards in the Video Slot

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While the A3000 video slot is electrically similar to the A2000 slot, the chassis hole for the rear bracket is significantly smaller. It's actually the same size as a typical PC/Zorro slot hole. As a result, the larger, flat A2000 videoslot boards will not line up with the sideways screw hole.

Commodore shipped many A3000's with slot adapters, a little metal frame which you could screw the card into, then secure the card and adapter into the chassis. This works perfectly with some boards such as the A2300 Genlock, but does not work at all with the VideoToaster 2000, for instance. This little adapter also works in the A4000.

The Toaster 2000 production board is another common misfit for the A3000. To accomodate all four BNC inputs, plus program and preview outputs, Input 1, also primary sync, is set at the very top of the flat backplane. With the smaller A3000 cutout, many users have found they need to hacksaw a segment of the chassis. When doing so, be careful of leaving metal shavings/dust in the system. A thorough vacuuming should do the trick. Also, the Toaster DRAM/framestore daughterboard and it's metal binding is a tight fit with the top of the A3000 desktop case. Be careful of not accidentally shorting connections on the metal top. As usual, heat and ventilation should be considered.

The A3000T has the same problem-they need to be hacksawed as well, although space and heat are less of a problem.

See also, @{"VideoToaster Incompatibilities" link "ToasterIncompatibilities"}

@endnode

@node Videoslot-Genlocks "Problems with using Genlocks on the A3000..."

Genlocks and the A3000

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Genlocks in general work the same as other Amiga systems. However, two problems may arise.

Sync

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Some genlocks will require sync into the video input to let the A3000 startup. Just feed in a blackburst source or lock the system to some house sync.

## Deinterlacer

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Some genlocks may cause distortions with the Deinterlacer circuitry. While usually the Deinterlacer runs apart from the genlock, this glitch has popped up before. It's normal.

See also, @{"VideoToaster Incompatibilities" link "ToasterIncompatibilities"}

@endnode

@node Deinterlacer-Tuning "Calibrating the onboard deinterlacer circuitry..."

Calibrating the Deinterlacer

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The Deinterlacer circuitry samples in the A3000's native NTSC or PAL output and scandoubles or deinterlaces it, outputting the new signal at a flicker free VGA level. In a way, it works very similarly to a Time Base Corrector, commonly found in professional video studios.

One issue that arises is calibrating the timing of this device. If the deinterlacer is ill-tuned, you'll see flickering specks on your display. It's very simple to adjust the unit, just use a potspanner, which is a plastic screwdriver with a small plastic or metal tip, and insert it into the hole on the rear of the A3000. This hole is between the DB15HD and deinterlacer toggle switch. Twist the trimpot left or right to correct the display. When the pot clicks, you know you've turned too much.

There were calibration images from Commodore on the A3000 distribution, with a special one for PLL, but as long as it looks okay for normal output, you're fine.

One mode that always looks weird is SuperHires, 1280x480. This is normal: the deinterlacer doesn't have the capability for such a detailed mode, and has to skip every other line.

@endnode

@node ROM-Issues "Information about the system ROM chips..."

## ROM Issues

~~~~~

Every Amiga depends heavily on the Kickstart ROM chips on the motherboard. The A3000 is no exception.

Types of ROMs

~~~~~

### 1.4 SuperKickstart/Softkick ROM

-Often referred to as softboot ROMs, these were originally shipped with early model A3000's. They automatically find a bootable drive named WB\_2.x:, and looks for a file called kickstart in the devs: directory of the system boot partition.

This is a specially encoded KickStart file.

You can put all sorts of ROM images for the 1.4 chip

to boot, including WB2.03, WB2.04, and also, WB3.1.  
Once it finds the file, it reallocates memory with the MMU,  
and effectively turns 512K of FAST RAM into a ROM.  
This is good because it's fast and easily upgradable.  
However, it will not work with 040 or 060 CPUs, as the MMU  
utilization is different.

#### 2.04 2.04 Kickstart Hard ROM

-These shipped with many machines. They don't use 512K  
of FAST RAM, but instead, have 2.04 burned in them.  
These will support 2.04, 2.05 and 2.1 software, plus  
040 CPUs. They do cause some incompatibilities with  
the A3640 accelerator, with Page Mode RAM.

#### 3.1 3.1 Kickstart Hard ROM

-Distributed by VillageTronic and other licensees, or  
copied by others, the 40.68 ROM is the latest revision.  
It supports RTG, 040 and 060 CPUs. The 40.70 ROM,  
is not as widely distributed. Some have had troubles  
with tape drives and this revision.

See also, @{"A3640-Issues" link "A3640-Issues"}

#### Incompatible ROMs

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The 3.0 ROM from A1200 and A4000 systems can't be used: Instead of
the 33C93 based driver code, the 3.0 build for A1200/4000 has code for IDE
devices instead through the Gayle chip.

ROMs from A500 and A2000 systems can't be used either, they're a
single chip (at least for most models of these systems) and again, do not
contain code for A3000 specific fetatures.

Extra ROM Silkscreens and Reversed Silkscreens

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There are extra silkscreen positions for a second pair of ROM  
chips on the A3000 motherboard. They are for different types of ROM,  
apparently left in for developers.

The silkscreened printing on the motherboard may indicate ROM0 and  
ROM1 incorrectly. Reversing them won't damage them.

#### ROM Speeds/Timing

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Some A3000 owners have noted that new 3.1 ROM chips can't be run at
25 Mhz. Set the ROM speed at 16 Mhz with jumpers J150 and J151.

Other Issues

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Some A3000 users have found that new 3.1 ROM chips cause SCSI  
instabilities by draining power from termination power.

@endnode

@node A3640-Issues "Using the A3640 CPU Accelerator board..."

#### A3640 Issues

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The A3640 is Commodore's Motorola 68040 board. Clocked at 25MHz,
it was never sold in any production A3000 desktop, but in A4000's and a

special version, the A3000T40. This is because it's too hot. It is not as good as other accelerators, which have onboard RAM for faster local access, fit physically better, and have built in FastSCSI connectors. This may be useful for nonlinear editing systems. The A3640 also does not support burst mode access.

Generally speaking, only revisions 3.1 and 3.2 of the A3640 will work, requiring Kickstart 2.04 or 3.1 in ROM. If it's 2.04, the first chip of the FAST RAM bank must be Page Mode. If it's OS3.1, Static Column is recognized and utilized properly.

The DMAC and RAMSEY versions should be at least -02 and -04. This is largely due to heat tolerances.

@endnode

@node Case-ButtonsPanels "Making your A3000 look proper..."

Eject Buttons and Cover Panels

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The eject button is specific to the A3000 and the Chinon drive. Using an A2010/FB354 mechanism from an A2000, or the A500 internal drive, one should find an extra A3000 button, remove the old one, and attach the new one. That is the only difference between the A3010 and A2010. The wide, flat eject button makes the system look real cool.

The other custom part is the cover panel. It has a corrugated texture on the front, and snaps onto the front with a pair of fingers on the sides, latching into the slot of the disk drive. The A3000 case has mouldings for two floppies. You should keep it on, so dust doesn't get sucked in and to keep the airflow running in the intended fashion.

Both parts were available from Commodore branches until the breakup of the company in 1994. Service depots may still have these for sale, but the easiest way to get one is to ask a user group.

@endnode

@node Case-LEDPanel "Fixing up the LED indicator panel..."

LED Indicator Panel

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The LED indicator panel, which has the green Power and the yellow Hard Disk activity lights, often gets broken. This is usually because the case was put on improperly or banged around during transport.

Often, it's the component board that gets cracked or cold solder joints opening. For the latter, just dab on lots of solder. For the former, use a voltmeter and trace out the connections, and use a simple jumper wire to reconnect up the LED.

The LED panel connects to the front, left of the A3000 motherboard with a 3 pin connector.

If your panel is unfixable, consider DriveLight 1.2, a useful Workbench utility that monitors the activity of any device, including the SCSI controller, and flickers a little indicator on screen. It's available on Aminet. (Aminet:/disk/misc/drivel12.1zh)

@endnode

@node Heat-U202 "Overheating of component U202 on the A3000 motherboard..."

U202/203: Chips That Overheat

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Many A3000 owners complain of strange graphics and disk errors, like windows and gadgets being trashed. Sometimes dots and horizontal lines will appear. This is likely due to the U202 and U203 components, a pair of Programmable Array Logic chips (format: 16L8-10) which tend to overheat. This is likely because they are in a part of the case where circulation is nearly nonexistent, especially when you have lots of hot disks and cards. These chips control various CHIP RAM DMA access issues.

The Commodore part references are 390526-02, 390527-02-if a dealership has them, just swap them out and it should be fixed. AmiTriX Development may have some of these components available, as may the new subsidiaries of Amiga Technologies. If you know someone knowledgeable, these PAL chips could be copied with an appropriate logic reader/burner. The protection bit has not been set.

Also, they can also be copied into GALs, which used less power and are cheaper and faster. GAL16V8's have been tested and checked by Simon Goodwin (simon@studio.woden.com) of Silicon Studio. Simon notes you'll need a fast GAL and a programmer that can convert between both formats.

Another source may be Amiga Technologies directly, which is now selling legacy Amiga parts through their web page.

@endnode

@node INT2-Issues "The INT2 line and PPC/SCSI FAST slot accelerators"

INT2-Issues

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A4000's and some A3000T models have a line called _INT2 on the FAST slot. On the A3000, this slot is CN606, and the line is on pin 82. However, this pin was not connected in desktop A3000's, making PPC and other accelerators which use this line incompatible with the A3000. Most accelerators which have onboard SCSI, will require a patch.

One example of how to get around this problem, is to wire a jumper patch using a lead clip, like the one supplied with WarpEngine 30xx series accelerators. This attaches to pin 21 of U350, a CIA interface chip.

Basically, you need to wire a jumper from pin 82 on the FAST slot to pin 21 of U350.

@endnode

@node Heat-General "General tips on keeping your Amiga 3000 cool..."

Heat-General Concerns

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The A3000 has a small profile case, which means heat is a big concern. Because of the configurability of the machine, every set up and its environment will be different. Here are some tips:

-Keep the casing on, as the airflow around the case is designed

to run around in a specific pattern.

- Keep an adequate envelope of open space around your machine, including at very least six inches behind the chassis. If you can, leave a foot. Don't forget the front and back.

- Put extra fans inside: DesTech's Mini Slot Fan is highly recommended: Found in many clone part stores, this small \$5-10 fan fits on a card bracket and draws air from inside and blows out. Place above hot cards. It's green.

Put extra cards and ventilate the area above 040/060 FAST slot cards as well! Hacksawing the drive chassis tray is one way to accomodate large heat sinks and fans.

Don't use temperature controlled low noise fans.

Some other suggestions from Internet users include:

- Don't place a monitor onto the case.

- Prop the machine up securely on thin pieces of wood below the case.

- Don't place the machine on a towel, no matter what your mother says. Furniture can be replaced, Amiga 3000's can't!

- Use a powerline filter or better yet, a UPS.

@endnode

@node Battery-Leak "Fixing leaking batteries..."

#### Leaking Batteries

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There is a battery on the Amiga 3000's motherboard which keeps the clock up and running, plus keeps the parameter RAM set. This RAM maintains things like the SCSI controller ID, Synchronous bits, Timeout modes etc.

Many of these batteries have started to disintegrate, not only on Amiga 3000's, but on A2000's, A501's and A4000's. No system is free from these issues: Quickly check if your battery, often blue or red in a little barrel shape on the left side of the A3000 motherboard, is leaking! If it is, you'll see little flecks of white acid crystallizing. Many users even reported that the battery had already started leaking onto the motherboard, corroding the copper traces. My own personal A4000 already had the battery leaking.

What to do? Immediately cut off, if not replace, the battery. NOW. Do it. Many saw it, put it off, and later had their motherboard torn apart and destroyed by acid because they didn't fix it fast enough.

To remove the battery, snip off the legs (in three points). This is recommended if you can't replace it immediately. Be careful about damaging chips around it. You may wish to snip the rear pin and rock the other two back and forth until it snaps easily. This may even be a better idea if you plan to replace it immediately-at least you won't get bits of acid all over your board.

To replace, it's highly recommended you desolder the battery. First, cut the battery off with a pair of snips. Then, unscrew the motherboard. Yes, this is a pain in the ass. There are tens of screws and hex pins. Once you've removed it, desolder the remaining legs of the old

battery. Use a low power 15W iron with a very small pencil tip. You may not need desoldering equipment, just heating the old solder up may let the old bit come out easily. If this doesn't work, get desolder braid or a sucker.

Once all three old pins are out, put a new battery in place. Replacement components are easily found at PC stores, electronics shops, and some surplus stores. You'll want a NiCad 3.6V 60 mAH component, although nearly any 3.6V NiCad battery will work. Ask especially for the three legged model. The two legged kind are electrically the same, but a pain to put in. Do not use Lithium batteries, these do not recharge and could cause an explosion!

A good idea is to bring the old one in and ask for a direct replacement. Of course, make sure you package it before you leave-use an old baby food jar or something. Battery acid is a bad thing.

Other suggestions, include using cordless phone batteries and the like. Use at your own risk.

If you used desoldering equipment, the clean holes should present no problem. If you're cheap and you didn't, then try this idea-put the battery in place, then heat up the old solder on the bottom side of the motherboard. Apply a little pressure to the battery. Physics should suck the leg into place with solder around it. Repeat with each leg.

Start up your machine, and let it run for an hour or so to charge up the new component, then shut down. Power up to check if the date and time are retained.

As for disposing the old battery, package correctly, and return to your appropriate government recycling center, or even your local electronics store like Radio Shack for proper disposal. It may be illegal in some places to put them in household garbage. Feel free to curse at the sucker before you toss it.

@endnode

@node Calum "More about Calum Tsang, that guy who's so excited, and just can't hide it..."

About the Author

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I will not be held responsible for any damage you incur on your own machine. This information is presented as is. Please contact me with suggestions, comments, and more information. This is crucial to keep the Hardware Guide updated. Certain areas require a lot more information, especially regarding SCSI and the Amiga 3000T specific issues.

tsangc@mie.utoronto.ca  
<http://www.ecf.utoronto.ca/~tsangc>

However, I cannot help everyone on their Amiga problems. I'm relatively busy as of late, so I can't guarantee I can respond to everyone. I also sold my A3000 too, as I bought an A4000/040 for \$200.

The A3000 represents the pinnacle of Amiga design and engineering for me, and to many other Amiga owners out there. If you had to pick one machine that was done right, a lot of people will say the A3000.



This package of Technical Notes was inspired by Warren Block's excellent A4000 Hardware Guide. (Aminet:hard/misc/a4khard.lha) It's in a similar style, but also in the fashion of the A2090 Technical Notes package I started in 1992. Thanks to Warren for helping and getting me started. Give this guy a job, Gateway!

Thanks to Olivier Broschart (A2000/030, 3000T/040), David D'Amico (A2500/030), Jim May (A2000/040), Steve Vetzal (formerly Commodore Canada and Wonder Computers), and Thom Mills (Randomize Imaging). Ross and Jane Agosta (A3000/4000), Glen Miller, Lanny Affleck (A3000) and Ryan Visima. Special thanks to Nadine Kerrigan, Stanis Yu, Sai Saiedfar, Brian Lima, Tara Weinstein, Renata Kopach and Mark Armer.

@endnode

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@{"Battery-Leak" link "Battery-Leak"}  
-Check if your battery is leaking!

@{"Case-Eject Buttons and Cover Panels" link "Case-ButtonsPanels"}  
-Help with those pieces of custom plastic up front.

@{"Case-LED Panel" link "Case-LEDPanel"}  
-Is your Power or Hard Disk light broken?

@{"Deinterlacer-Tuning" link "Deinterlacer-Tuning"}  
-Do you see weird flecks of flickering image "dirt"?

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-General Do's and Don'ts about airflow and heat considerations.

@{"Heat-U202 Graphics/Disk Problems" link "Heat-U202"}  
-Overheating of PAL chips U202/203 can cause on screen garbage.

@{"INT2-Issues" link "INT2-Issues"}  
-Required modification for PPC and SCSI FAST slot cards.

@{"Rom-Issues" link "Rom-Issues"}  
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-Troubles with termination may cause SCSI problems.

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-System not powering up with a Genlock, or a weird display?

@{"Video Slot-Physical Fit" link "Videoslot-Fit"}  
-Squeezing in boards?

@{"VideoToaster Incompatibilities" link "ToasterIncompatibilities"}  
-The A3000 can cause headaches for VideoToaster owners.  
Look at these useful Toaster tips.

@endnode

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